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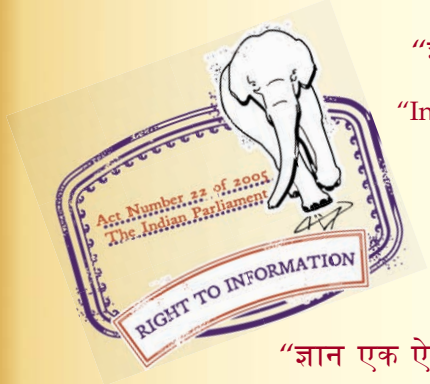
[MTD 8: Copper and Copper Alloys]



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IS : 8631 - 1977
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SPECIFICATION FOR COPPER BASE ALLOYS FOR MARINE PROPELLERS

UDC 669·35 : 629·12·037

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SPECIFICATION FOR COPPER BASE ALLOYS FOR MARINE PROPELLERS

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Indian Standard

SPECIFICATION FOR COPPER BASE ALLOYS FOR MARINE PROPELLERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 November 1977, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Marine propellers required to propel the ships have to withstand heavy corrosive and erosive effect of saline water besides high stresses which may be caused due to adverse sea conditions. For this purpose, it is necessary that the material used for casting these propellers should have superior mechanical properties as well as good corrosion resistant properties. Aluminium and manganese bronze are considered to be the most suitable material for this purpose.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard covers the requirements of two grades of copper base alloys used for casting propellers.

2. SUPPLY OF MATERIAL

2.1 The general requirements relating to the supply of material shall be as laid down in IS : 1387-1967†.

*Rules for rounding off numerical values (*revised*).

†General requirements for the supply of metallurgical materials (*first revision*).

3. CHEMICAL COMPOSITION

3.1 The material when analyzed in accordance with IS : 4027-1967* shall have the chemical composition as given in Table 1.

TABLE 1 CHEMICAL COMPOSITION

(*Clauses* 3.1 *and* 8.2.1)

CONSTITUENT	PERCENT	
	Grade 1	Grade 2
Copper	Remainder	55·0 *Min*
Aluminium	8·8-10·0	0·5-2·5
Iron	4·0-5·5	0·7-2·0
Nickel	4·0-5·5	1·0 *Max*
Manganese, *Max*	1·0	3·0
Tin, *Max*	0·10	1·0
Lead, *Max*	0·05	0·50
Silicon, *Max*	0·10	0·10
Magnesium, *Max*	0·05	0·10
Zinc, *Max*	0·50	Remainder

4. MECHANICAL PROPERTIES

4.1 The material when tested in accordance with IS : 2654-1964† shall have the tensile properties as given in Table 2.

TABLE 2 TENSILE PROPERTIES

(*Clauses* 4.1 *and* 8.3)

GRADE	TENSILE STRENGTH N/mm² (kgf/mm²) *Min*	ELONGATION PERCENT ON GAUGE LENGTH OF $5{\cdot}65\sqrt{S_o}$, *Min*
1	640 (65·0)	13
2	460 (47·0)	18

5. MASS OF INGOTS

5.1 Unless otherwise agreed to between the supplier and the purchaser the mass of ingot shall not exceed 15 kg.

*Methods of chemical analysis of bronzes.

†Tensile testing of copper and copper alloys.

6. TEST PIECE

6.1 The test piece shall be cast separately in the same mould material used for casting of the alloy ingots.

7. MARKING

7.1 The name, initial or trade-mark of the manufacturer, grade and any other information required by the purchaser, shall be cast or otherwise legibly marked on each ingot.

7.2 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

8. SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Lot — In any consignment, ingots manufactured at the same place shall be grouped together to constitute a lot.

8.2 Chemical Composition — One sample for chemical analysis shall be drawn from each melt (heat). For this purpose, three ingots shall be selected from a melt (heat). The ingots so selected shall be drilled or sawn right through the section. The drill or saw used shall be thoroughly clean and no lubricant shall be used in the operation. The drillings or sawings shall be treated with a magnet to remove any particles of steel introduced while drilling. The drillings or sawings after being thoroughly mixed, shall constitute the sample for chemical analysis.

NOTE — The materials required for chemical analysis from each ingot intended for testing shall be in accordance with IS : 1817-1961*.

8.2.1 If the results of analysis satisfies the requirements specified in Table 1, the lot shall be accepted. If the test results fail to satisfy the requirements, two more test samples (drawn from the same composite sample) should be analyzed in order to confirm that the analysis has been done properly. Should any one of the analysis from these additional samples fail, the lot represented by them shall be rejected.

*Methods of sampling non-ferrous metals for chemical analysis.

8.3 Mechanical Tests — Three test bars cast to shape in accordance with IS : 1408-1959* shall be separately cast in the presence of the Inspector representing each melt (heat). They shall be cast in moulds of the same material as used for the ingots they represent. The lot shall be considered as conforming to the physical properties of the specification, if the results so obtained meet the requirements given in Table 2. Should the test specimen fail to pass the requirements given in Table 2, another two bars should be taken for testing. Should any of these test bars fail to meet the requirements of Table 2, the lot represented by them shall be rejected.

*Recommended procedure for inspection of copper-base alloy sand castings (*first revision*).